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Communities use GIS and GPS to assess climate risks in the Cook Islands

An early warning system delivers rainfall data to Kenyan farmers' cell phones

An SMS service delivers quick answers to farmers' climate questions

Adapting to climate change

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Editorial

An atmosphere for change

Farmers in ACP countries face increasingly unpredictable weather conditions, where late rains wash away newly planted seedlings or crops are scorched in dry soil before they are ready for harvesting. To help them cope with the erratic conditions, farmers are using ICTs to stay informed with regularly updated weather forecasts to help them plan their seasonal activities, and ensure timely delivery to markets. They are also using technology to share their expertise with other producers around the world to help them deal with extreme and variable weather conditions.

With a better picture of the possible dangers, the community developed strategies to deal with increasingly unpredictable weather

In the Cook Islands, a local NGO, Te Rito Enua, worked with four rural communities to identify potential threats from the changing climate. Teams from the communities used GPS devices to record the locations of houses, farmland, water sources and other important landmarks. The project team entered the data into a geographic information system (GIS), combined with information from the government and other sources, to develop detailed maps of the resources available to the communities.

Monitoring

Through this participatory mapping project, the communities were able to see which areas of their land would be vulnerable to prolonged periods of unseasonal rain or drought. With a better picture of the possible dangers, the community set up committees to develop strategies to deal with the increasingly unpredictable weather and protect their most valuable resources.

Meanwhile, a team of scientists from the University of Oklahoma is trying to improve the reliability of weather information. They have developed a system to collate rainfall data in West Africa, using GIS to plot the precise locations of the rain gauge stations. The team tested the system, known as Rainwatch, in Niger, which has had wildly fluctuating rainfall patterns in the last few years.

Staff from the local meteorological service can use Rainwatch to analyse the data, and produce maps and graphs that are easy to interpret. The service can share these visual representations with researchers and government ministries, and pass them on to radio and television stations, who can broadcast the information rapidly to even very remote communities. Previously, it could take up to two weeks to make rainfall information available to the public. Meteorological services can also use the system to monitor rainfall patterns, and set up early warning mechanisms when specific areas experience very wet or dry spells.

Adaptation for all

It is especially important that farmers get information on imminent threats if they are to plan their activities effectively and get the best from their crops. For many generations, the Nganyi community, from the Kisumu region of Kenya, have used traditional methods to predict the weather and prepare for the planting and harvesting seasons. In recent years, however, they have found that their forecasts are less reliable due to increasingly erratic weather patterns.

In a pilot project with the IGAD Climate Prediction and Applications Centre (ICPAC), the community is now working with the Kenya Meteorological Department to share information and collaborate their efforts to predict the weather for the coming seasons. The project collates the information into a database and transmits it directly to the farmers' cell phones, giving them advance weather details to help them get the most out of their crops.

And in Zambia, the National Agricultural Information Services has refined its question-and-answer service to help farmers prepare for unseasonal weather. They have now made it easier, and faster, for their experts to deliver details via SMS to farmers, showing that even the information services have to be prepared to adapt to climate change. ◄

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Information exchange

Adapting to climate change

There are two ways we can address climate change. One is through mitigation efforts that reduce greenhouse gas emissions and decrease the great amount of carbon dioxide in the atmosphere. The other approach, adaptation, recognises the risks and the fact that the climate will continue to change. Adaptation means adjusting to existing or expected impacts. Both actions are equally important and challenging. They require a significant amount of attention, direct response, policies, plans and implementation strategies, across all levels of society.

Adaptation and mitigation actions are possible at the local level too. For instance, using renewable energy sources or planting trees to expand forests is a mitigation action, while an adaptation action may involve sharing information so that local communities can better respond and adjust to climate change. That information, however, needs to be relevant and up to date if communities are to make effective changes.

The Global Connectivity team at the International Institute for Sustainable Development (IISD) researches the use of ICTs in the production of greener economies, environments, and societies. The team is currently participating in the eTransform Africa project and analysing how ICTs are used to support adaptation action at the community level. The project has brought together a consortium of researchers to explore how a variety of sectors, including agriculture, health, education and others, can use ICTs to address the major economic, environmental and social challenges facing the African continent.

IISD is also gathering case studies showing how ICTs help communities adapt to the effects of climate change. It has observed that people already use a number of platforms to share information, either online or through other means. AfricaAdapt, for example, is a continental initiative for sharing adaptation information between researchers, policy makers, civil society organisations and communities.

Community radio is another effective method of disseminating information, since it overcomes illiteracy problems and the information can be translated into local languages. Some groups have even developed ways to use radio to get feedback from the communities, to find out how they were adapting to climate change and to assess how targeted messages were being received and used.

GEORGE ESIRI / REUTERS

Community groups are making use of websites, radio and cell phones to share information on climate change adaptation.

Lessons for farmers

A project in South Africa, for example, uses sensors in the Crocodile River that transmit temperature and water quality data via the cell phone network to a remote location. There, they are analysed so action can be taken that affect the dam downstream. New, more efficient and intelligent sensor networks are being tested around Lake Malawi that generate better quality data and perform initial on-the-spot analyses before transmitting the information, resulting in a reduction of the time needed to make decisions.

In Uganda, community knowledge workers (CKWs) from the Grameen Foundation use applications installed on smartphones that receive regularly updated information. Users can pass this information on to farmers and also upload data from the field. For example, they receive regular weather updates from the country's meteorological department which they can share with the farmers. The CKW can interpret the information to suit the local environment and send data back to the relevant content providers to help them develop their services.

Local communities are continuously exploring new and innovative ways of adapting to climate change, and more needs to be done to make it easier for them to share their experiences with others. Communities also require additional support and partnerships with the private sector, provincial or national government and other agencies to deploy new technologies and enhance existing ones used for adaptation. Further research may be required in this area, and strategies that link research outcomes to policies should be explored.

Farmers are very aware of climate change and the effects it can have on their livelihoods. They see that productivity has changed in recent years and know that a number of factors have caused this change, including increased rainfall and unpredictable weather patterns in their region.

Many ACP farmers have already had to adapt to their environment. They currently work in extreme conditions, and have developed ways to grow crops in very dry or very wet land. And researchers are now also realising how this indigenous knowledge can help to enhance scientific knowledge. They are looking at ways in which these farmers can share their methods with others around the world, with people who are now facing similar situations.

Technology will be very useful for gathering and disseminating this information quickly, and to a wider audience. Such initiatives can help the global community understand the helpful adaptations that ACP farmers have already made, and can provide the means of sharing information that will help all producers deal with future challenges. ◀

Related links

eTransform Africa
➜ www.etransformafrica.org

AfricaAdapt
➜ www.africa-adapt.net

Adapting to climate change

Adapting to risk

A local NGO tested an innovative participatory mapping approach to help communities in the Cook Islands assess climate risks. The resulting maps highlighted vulnerable areas, allowing the communities to develop strategies to adapt to climate change.

Extreme weather events, such as tropical cyclones, long periods of drought, sea level rise and higher temperatures, lead to loss of soil fertility and land degradation, reducing food security in farming communities. The Cook Islands, like many small islands, are highly vulnerable to the impacts of climate change and sea level rise. They comprise small land masses surrounded by ocean, and are located in a region prone to natural disasters.

With limited long-term meteorological data available, it is difficult to make accurate predictions on how climate change will affect the Cook Islands. However, there is consensus that the region is likely to experience more frequent extreme weather events, including floods, droughts, periods of extreme heat, an increase in cyclone intensity, increased climate variability and rise in sea levels.

Observations by Pacific Island communities indicate that predicted climate change effects are being experienced, and are causing considerable social, economic and environmental pressures. The ability of the communities to adapt to a changing climate is generally low, due to lack of information and awareness of the potential effects of changing weather patterns. Traditional natural resource management practices, however, still practiced in some parts of the Cook Islands, provide important tools for resilience in the face of environmental change.

In response to growing concerns about the possible effects of changing weather patterns, a local NGO, Te Rito Enua (TRE), tested the use of participatory GIS to assess climate vulnerability and adaptation planning in the Cook Islands. Together with the country's government and with the support of the Asian Development Bank, TRE worked with four communities on the islands of Rarotonga and Aitutaki.

Both islands face similar problems of water shortages, deforestation and soil erosion as a result of climate change. Their terrain, however, is quite different. Rarotonga, the most populous island in the country, is mountainous, steep and heavily forested. Aitutaki is mainly atoll and lagoon, and so is flatter with some steeper land on the remains of the submerged volcano around which the atoll formed.

Training

The project began in 2010, and lasted 10 months. In that time, TER worked with the communities to develop the practical tools and skills necessary to produce their own specific climate risk analysis. The organisation gave training courses in participatory mapping, with components in vulnerability and risk assessment, climate models, GPS and GIS, and map interpretation.

Participants, mostly volunteers, came from a cross-section of the community demography, ranging from school-aged youth to elders, including community leaders, resource users and professional resource managers. As a result of the training, all participants had a basic knowledge of the methods to be employed in the project, which they used to collect data from the field, and record assets that could be included later on maps.

This data, which participants within their own frame of reference, helped them identify issues that could affect the vulnerability of individual households and their wider community. They looked at facilities such as energy provision, water supply, sanitation services, port facilities and even civil defence.

Important risks associated with climate change were identified through the assessment and mapping processes that were neither considered nor evident during national-level vulnerability assessments. One example is the waste management facilities situated near the pilot communities. Runoff from these landfill sites at times of heavy rain can adversely affect the adjoining aquatic ecosystems. The communities rely heavily on these vulnerable coastal resources for their livelihoods, and so future waste management solutions need to include these considerations at the early planning stages.

Additionally, the mapping information showed that disaster response shelters are often placed in areas vulnerable to sea-level rise and storm surge inundation. Also, some households could experience a shortage of water as the climate changes, which will mean enhanced water conservation measures, such as developing programmes for improved rainwater harvesting. Rarotonga in particular is dependent upon surface water supplies for domestic consumption and has suffered periodic water shortages in recent years as sources have dried up.

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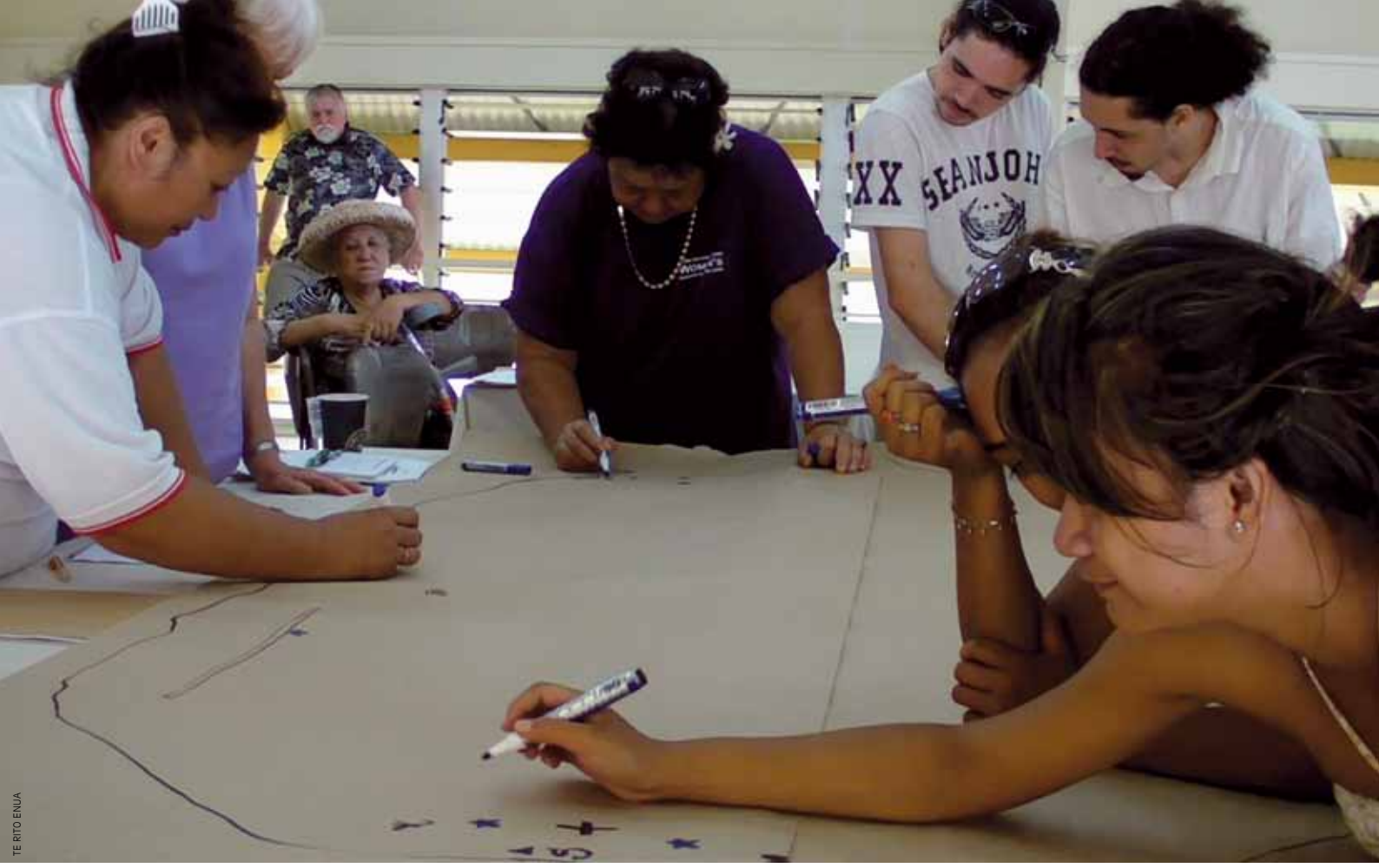

TE RITO ENUA

Another significant factor revealed by the project was the extent of invasive plant species in the environment. Observers had noticed that the watersheds of both Rarotonga and Aitutaki were infested with *Cardiospermum grandiflorum* (balloon vine), *Merremia peltata* (kurima), and *Mikania micrantha* (mile-a-minute weed).

Available evidence shows that the species are having a devastating impact on the native vegetation and natural watershed systems. The implications for water supply in this already water-stressed country are not clear, but are a cause for concern.

Practical solutions

After the data collection phase, the project team integrated the information into existing government GIS files to highlight areas where a changing climate could potentially affect the environment. The resulting map layers were combined with information from a climate model commonly used for planning in the region. The new data were shared with the government to be integrated into their GIS database and made accessible to the National Environment Service, and relevant ministries.

Each community received a paper map, known as a 'vulnerability atlas', showing the information specific to their area. The project team also facilitated meetings to discuss the implications of the mapping and the surveying process, and to gauge community perceptions of climate change. These discussions identified the main risks and developed plans for priority actions. Each community set up a Climate Change and Disaster Committee to ensure the plans would be followed.

In some instances, the communities identified traditional practices, including organic farming and resource management methods, as having considerable value as adaptation measures to reduce the greatest climate change risks. One example was the traditional ra'ui system of resource allocation, which two communities identified as a way to improve the resilience of vulnerable water resources. Communities in Aitutaki also suggested promoting traditional building practices and styles, which could help mitigate the effects of the anticipated increase in extreme heat events.

Some community participants were initially sceptical about the project, because they felt that the government had already mapped everything that was important. However, once they were able to re-envision maps, and given access to mapping tools, the communities became enthusiastic. As one of the senior participants of the Aitutaki planning process observed, 'I've lived on the island most of my life, and have today seen things I've never noticed before.'

The project made use of existing geographic information available from the government and combined it with the local knowledge captured by the community members.

The project found that the participatory processes generated local knowledge unavailable to high-level planners

Being able to participate in the production of maps that were explicitly for and about them gradually led to discussions on their social and physical environment that went well beyond the more obvious dimensions of climate change and climate adaptation. The discussions touched on deeper social issues such as cultural erosion, loss of language, unsustainable resource use, invasive species and out-migration.

Planning for climate adaptation became a way of framing the broader suite of development issues. Because of this, the communities were able to take

Examples of priority actions identified by the communities

Matavera, Rarotonga

- Relocate emergency shelters inland.
- Reduce vulnerable housing through relocation, home improvements, and pairing with householders with secure housing for emergency relocation.
- Establishment of a ra'ui (traditional resource allocation system) in the coastal zone to protect vulnerable resources and increase resilience.
- Convert household septic systems into a waste treatment system for the community.
- Encourage water conservation and rainwater housing.
- Control and/or eradicate alien invasive species.

Arutanga–Ureia, Aitutaki

- Discourage building in vulnerable areas.
- Establish a community-partnering programme to provide safe shelter for those in the most vulnerable homes.
- Amend building code and encourage new construction to higher standards.
- Establish community micro-finance or insurance to assist homeowners affected by extreme weather, and develop a reinsurance scheme for vulnerable businesses.
- Raise public awareness of the need to build resilient homes.
- Establish natural defences along the coast including through ecological restoration.
- Establish community cleanup work details (*tutaka*) to control areas of stagnant water.


TE RITO ENUA

ownership of mapping their environment and the assets within it that are important to their identity and survival.

The project showed that a community-based participatory approach is a valuable tool for bringing the reality of climate change to bear at the local and household level. A process of discussing, debating, and problem solving produces more resilient communities that are more able to organise themselves and prepare for a changing climate.

Not only does participatory mapping provide communities with tangible evidence of the risks associated with climate change, but the community mapping process also highlights behavioural and development issues that affect the vulnerability of individual households and the community at large.

There was a discernable sense of empowerment by participating communities in developing vulnerability maps and having them available. Without exception, all the pilot communities requested printed copies of the vulnerability atlases for display in public places to engender support for change and implementation of their proposed action plans.

All-inclusive

Measures to build upon this project would include using the existing capacity as an emerging centre of excellence. The centre's prime role would be to educate trainers to improve the ability of community mapping practitioners to convey techniques and best practices to other communities.

To overcome the bottleneck in trained personnel, and the high costs of using commercial products, the training of young and motivated community members in open source GIS products, such as Q-GIS, will make the adoption of this technology for community mapping possible. A regional facility to build capacity for community mapping and access to remote sensing analysis will go far towards helping Pacific island communities to adapt to climate change.

The project found that the participatory processes generated local knowledge unavailable to high-level planners. The process also generated a strong sense of ownership of the outcomes by communities, and increased the knowledge and awareness of participants about climate change risks and the implications for their families and communities. Finally, it increased the skills needed to develop more communities that are more resilient.

This approach allows adaptation strategies to be developed from the bottom-up – from the family through to the community, island and eventually the national level – at the same time as the national strategy is developed from the top down.

It should be noted, of course, that a community-based approach is no substitute for a technically rigorous national approach to climate change. Some important technical issues lie outside the competency of communities, and the scale can be too great; a patchwork of community approaches could potentially result in the geographic division of responsibilities that require a more unified approach. For example, ecosystem-based approaches require interventions at ecosystem scales.

However, it is also clear that the communities are not fully engaged on the realities of climate change. This is clearly an issue of environmental awareness and ownership. Climate change issues have so far been the 'government's role' in the eyes of many communities, largely due to government officials being the ones engaged in the climate debate and conducting climate change vulnerability and adaptation activities.

Linking the national efforts to local communities, therefore, is best demonstrated through the community-based approach of site-specific adaptation planning. Adaptation thus becomes everyone's business. ◄

Forecasts for a fairer future

A system delivering weather details via SMS to farmers in Kenya makes use of traditional and modern forecasting methods, alerting them to periods of heavy rain or drought.

Adapting to climate change

Periodic floods and droughts have already had a major socio-economic impact in Kenya, and led to reduced economic growth in recent years. The extreme weather from 1998 to 2000 was estimated to have cost US$ 2.8 billion from the loss of crops and livestock, forest fires, damage to fisheries, and reduction in hydropower generation, industrial production and water supply. Droughts in 2004, 2005 and 2009 affected millions of people and resulted in major economic costs from restrictions on water and energy, while the current drought in the Horn of Africa is said to be the worst in 60 years.

There are also health concerns as changing weather patterns cause the incidence of pests and diseases to rise in some areas. Recent studies, for example, show that people living in rural parts of Kisumu region will have a far greater risk of contracting malaria by 2050 than they have now. There is, therefore, a need for an effective early warning system responsive to the needs of rural communities.

The IGAD Climate Prediction and Applications Centre (ICPAC), a climate research institute representing seven east African countries, is working on a system using cell phones to help farmers deal with the negative impacts of climate change. They are initially working with farmers from the Nganyi community around Kisumu as they had previously worked with ICPAC. The Nganyi are known for their own elaborate techniques for predicting the weather, based on knowledge and techniques passed on from generation to generation. The farmers have suffered in the last few years, as these traditional forecasting methods have proven less reliable in the face of increasingly erratic weather patterns.

There are still many other sources of climate and weather data, such as brochures, community meetings, radio and television programmes. However, the community felt that the information often came too late to be useful, indicating that perhaps these more conventional modes of dissemination were not adequate. Also, many of the farmers were unfamiliar with the terms used in modern meteorological updates and were unable to interpret the technical language in a way that applied to their own lives.

Weather information from other sources often comes too late or in a form that is difficult for the farmers to understand.

FINBARR O REILLY / REUTERS

Perfect timing

Cell phones, however, have become invaluable for the Nganyi. Initial project research showed that 88% of respondents in the community owned a cell phone, most of whom used it daily, while another 11% had access to one through a family member or neighbour. A method of delivering information via cell phones could, therefore, be useful for reaching a large portion of the population.

The new system makes use of the Nganyi's traditional forecasting techniques combined with data from the Kenya Meteorological Department (KMD). The community's forecasters, known as rainmakers, meet with the members of the KMD every six months, before the onset of the twice-yearly periods of heavy rainfall, to discuss their respective findings. KMD staff compile the resulting information and enter it into a database. The information is then processed and packaged into a format suitable for sending as an SMS message, which is sent using an SMS gateway, a computer program for sending multiple SMSes from a single computer. This program broadcasts the messages through the cell phone network to the Nganyi farmers who have their numbers registered on the cell phone database. The information is delivered quickly, is relevant to the specific area and is written in the local languages of Kiswahili and Luhya.

The messages contain details such as rainfall intensity and length of dry spells between rainfalls, if any are within the forecast range. This type of information helps farmers decide which crop to plant and when, and estimate the best time for weeding and harvesting. Extension officers visit the community to give practical advice, where necessary, on the various tasks.

The system, therefore, gives the farmers an early warning, allowing them to prepare food reserves for the period during and after extreme weather conditions. This reduces their dependence on government resources for food and shelter when drought or floods affect the country. Timely weather information can also help the farmers manage their crops efficiently, which can lead to improved output and increased income.

The farmers have to pay to be part of the scheme, a cost that is prohibitive to many, according to project research. The system currently delivers the information to just 40 farmers. The project will require external funding to reach more producers, at least for the first two years until it becomes financially self-sustaining.

An assessment of the project showed that there is a great demand among the farmers to break out of the cycle of poverty. They felt they could achieve this if they had increased access to competitive markets and more power to negotiate better prices for their produce. The information from the ICPAC project could help the farmers realise this as it could improve the productivity and quality of their crops. ◀

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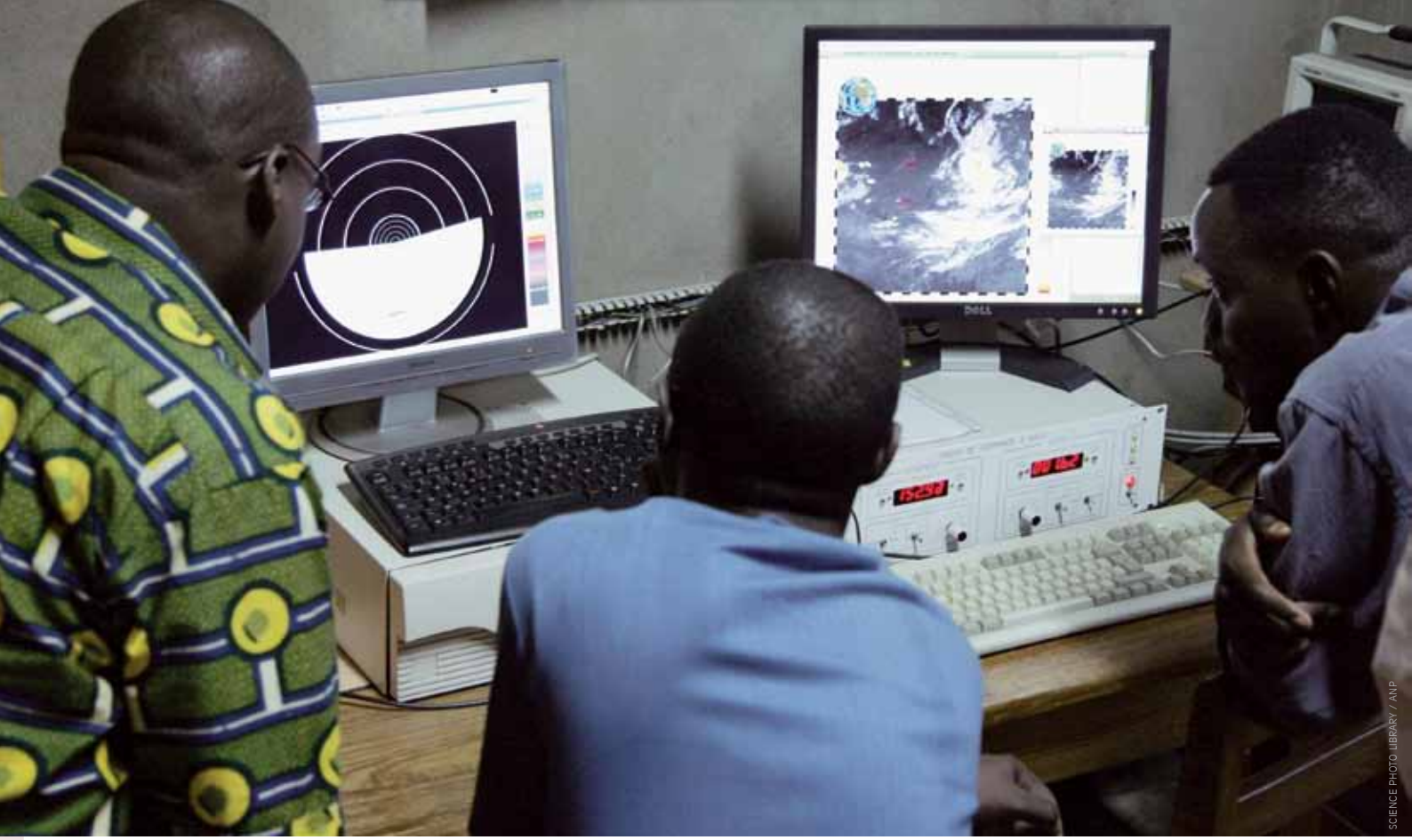

Increasing the flow of data

Climate researchers have developed a system that uses GIS, computers, and the internet to improve rainfall data management and information delivery to farmers in West Africa.

Adapting to climate change

Sub-Saharan Africa is highly dependent on rainfall. More than 90% of the land is used for farming, very little of which is irrigated. Despite this reliance on rainfall, there are relatively few monitoring stations in the region that gather the data that farmers need to plan their seasonal cultivation processes. Even in areas where rainfall data are collected, several weeks can pass before the information is processed and made available in a form that is useful to farmers.

To speed up and simplify the data collection and management procedures, a team of researchers from the University of Oklahoma has developed a geographic information system (GIS) that monitors rainfall and its seasonal patterns. Known as Rainwatch, the system can also automatically generate visual representations of the data that can be easily interpreted by interested parties, including farmers.

The team has initially tested Rainwatch in Niger, where the *Direction de la Météorologie Nationale du Niger* (DMNN) is responsible for monitoring weather and climate. The country suffered a severe drought in 2009, followed by its wettest year in a generation in 2010, and then a return to severe rainfall deficiencies in 2011. Although there are more than 200 stations in Niger's rainfall monitoring network, most are 'rain gauge only' sites maintained by volunteer observers. They report rainfall data to DMNN's operations office in Niamey once a day by telephone or radio. Only 14 stations transmit data on an hourly basis throughout the year, using telex and phone.

From these data, DMNN compiles rainfall reports that are broadcast on national and local radio and on national television – although TV reception is limited to the major urban areas. DMNN also publishes regular bulletins for the country's eight provinces, and shares data with policy makers and the national committee for early warning and disaster management systems (*Comité Nationale du Systeme d'Alerte Précoce et de Gestion des Catastrophes*).

Although rainfall levels are broadcast on radio daily, it can take up

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Related links

Direction de la Météorologie Nationale du Niger
➜ www.meteo-niger.net

African Centre of Meteorological Applications for Development (ACMAD)
➜ www.acmad.ne/en
Centre Africain des Applications de la Météorologie pour le Développement
➜ www.acmad.ne

RAINMAN
➜ www.dpi.qld.gov.au/rainman

National Oceanic and Atmospheric Administration
➜ www.noaa.gov

to two weeks before DMNN releases data that have undergone any kind of analysis. Users of rainfall data outside the research community are not interested in exact rainfall statistics. Most farmers and other groups who depend on rainfall prefer qualitative information relating to previous seasonal patterns. Farmers, for example, simply want to know if the weather is dry, wet, or normal for the time of year. A long delay in delivering processed data means they cannot rely on the information, and cannot plan ahead.

Customised

Rainwatch was developed to alleviate such limitations, and improve the way rainfall data is collected, managed and disseminated throughout West Africa. The system consists of a database and a program that customises several functions of ArcGIS and MapObjects software. The database is linked to a graphics feature, which automatically updates the related charts and graphs as new data are added. The software adaptations make it easy for the user to process and view the data, and prepare it for publication and distribution.

When users log on to Rainwatch, they see a map showing the geographic locations of rainfall monitoring stations throughout the country. Users can click on the relevant icon to view the rainfall data for a particular station, then choose to compare the figures for a particular period of time against the median or with other years or even with the results from other stations. The user can then use the program to produce a variety of graphics to illustrate the data.

The number of sites and/or years that can be seen simultaneously is limited only by the amount of information on the database. Users can also request further analyses of the data to show the frequency and intensity of rainfall in certain areas, or view the occurrence of dry spells; information that is especially useful to farmers.

The results are, of course, only as good as the data. Rainwatch works best and provides the most accurate analyses when an optimum number of observers regularly contribute data to the system. By simplifying the data management processes, Rainwatch could be the catalyst needed for many countries to improve their rainfall monitoring procedures. The researchers hope the system will be adopted more widely throughout West Africa where other more complicated rainfall data dissemination systems have had limited success.

Increased availability

Rainwatch uses self-explanatory symbols and easy-to-understand terminology. When the system was tested, new users quickly became comfortable and could navigate their way through its processes within ten minutes. The test users also found it easy to follow the system's logic, and fully understand and interpret the graphics they produced.

Based on feedback from users so far, the research team is developing an updated version of the program. Users suggested including a feature that would trigger an early warning system once rainfall, or lack of it, reached a certain threshold. Users also wanted to be able to export data to spreadsheets easily for further analysis. The upgraded Rainwatch will also include other climatic variables, such as temperature, streamflow, and soil moisture – which are linked to activities like irrigation scheduling.

Another important change will be to make Rainwatch compatible with free GIS software. This will make it available to users who cannot afford the product licence for the ArcGIS program, something that has been required up to now. A lower cost version of the system would make it possible to train more observers and equip observation stations throughout the region, which could act as local weather information centres. Providing more localised services could lead to farmers having a greater awareness of rainfall data, and a higher likelihood of being able to use the information. With all these improvements, the researchers hope that Rainwatch will become the African counterpart to Australia's Rainman rainfall monitoring software.

There are already plans to expand the use of Rainwatch beyond Niger. Starting in 2010, the long-term plan is to develop it into a web-based application that would be available to anyone with internet access. It could then be used alongside other climate information initiatives, using radio or cell phones, for example, to deliver weather details to people in rural communities.

Rainwatch could be the catalyst needed for many countries to improve their rainfall monitoring procedures

The researchers believe that Rainwatch can especially benefit national meteorological services by improving the automation of rainfall data collection and database management. The ability to produce easily interpreted charts and graphics increases the likelihood that the information is distributed to more people. These are critical features in reducing the time lag between collecting the data and delivering it to farmers, and providing it in a format to help them adapt to a changing climate. ◀

Rainwatch's easy-to-develop charts and graphs make rainfall data analysis simple.

Rapid response system

Farmers in Zambia with climate change questions can now receive quick answers via SMS from a new system developed by the country's National Agricultural Information Services.

Adapting to climate change

In recent years, the Zambia National Agricultural Information Services (NAIS) has been receiving an increasing number of questions from farmers concerned about unpredictable weather patterns. Farmers are pointing out that sometimes the rains come earlier than usual, and when they do come, they are so heavy that they ruin the work the farmer has done to prepare the land. Sometimes the opposite is the problem and there is too little rain to water the crops.

'The standard advice we gave in past is no longer relevant,' says Darlington Kahilu, an agricultural information officer with NAIS. 'For example, we used to tell farmers to plant their maize seeds as soon as the first rains came. The rains would usually continue for a few weeks and germinate the seeds. But now there could be a dry spell lasting a month or more, killing the new seedlings. The farmers then have to spend precious time and money replanting.'

NAIS uses a mixture of print and electronic media to provide agricultural information. Radio is especially useful, and many farmers listen to programmes in groups, often with an extension worker, and then discuss the issues raised in the broadcast. If they still have questions, they can fill in an evaluation form and send it to the nearest NAIS district office. The district office passes the form to the provincial office, where it is finally sent to the main country office. There, a NAIS radio producer assesses the questions, and contacts relevant specialists in agricultural research institutes and government ministries. Based on their feedback, the producer prepares a response for broadcast in a subsequent radio programme.

The whole process can take up to two months. The farmers who asked the question have to wait all that time before they get an answer. In an effort to speed up the process, the department started to look at alternative methods of delivering the information. 'We looked at the technology currently available, and saw an opportunity to give farmers the information they needed in a shorter time,' said Kahilu, a radio programme producer with the NAIS.

The information sent to farmers on the SMSize system is also broadcast on the regular agricultural radio programmes.

Good reception

Together with the International Institute for Communication and Development, and a local software developer, NAIS developed a system, called SMSize to which farmers can send a question via an SMS from a cell phone. The question arrives directly at a server computer at the central office, where the producer researches the answer and sends back the information to the phone of the querying farmer, in the same language as the original request.

'Instead of taking several weeks, the farmers now get the information within a day or two,' said Kahilu. 'We also still use the questions and concerns raised by the farmers to develop material for the radio programmes which will help other farmers facing similar problems.'

Delivering the information to cell phones helps the people living in areas where even radio reception is poor. Cell phones are now so popular that there will be at least one person in every community who owns a phone. Even if the network does not cover that particular village, as soon as someone is in an area with reception, they can send an SMS question and receive an answer that they can then share with the rest of the community.

The farmers pay the cost of sending an SMS to the system, which is currently slightly more expensive than the normal cost of sending an SMS. However, since a single SMS can only carry 160 text characters, the farmer has to pay for two or three SMSes if the question is longer. The information officers also have the challenge of keeping their replies as short as possible, which can be difficult if a more detailed explanation is necessary. The cost of the replies is covered by the department, and NAIS is looking at ways of reducing the cost of sending requests to the system.

> *'The standard advice we gave in past is no longer relevant.'*
>
> *Darlington Kahilu, agricultural information officer with NAIS.*

NAIS tested SMSize in the northern province of Kasama, and is currently working to expand the project to cover the whole of Zambia. 'We have already started informing farmers around the country, and alerted the provincial offices, to make them aware of the system and how it works,' said Kahilu.

NAIS was especially encouraged by the feedback from the Kasama farmers. 'They told us that they now get a better service delivered in a shorter time,' said Kahilu. 'One tomato farmer, Mr Kennedy Kanyanta of Ngoli, pointed out that his crop is especially vulnerable to sudden weather changes. The tomatoes could be destroyed if he had to wait for a month to get the right advice. Now he has the information within days, and can take the appropriate action in time to save the crop.' ◄

Darlington Kahilu (dakahilu@yahoo.co.uk) is an agricultural information officer and programme producer with the National Agricultural Information Services in Zambia

Global warming on the map

Evidence from the field is paramount when it comes to understanding the effect climate change has on the biosphere. While the causes and consequences of that change can be hard to grasp, hard facts from the field can help us to understand where and what is affected, and how.


GEORGE MOLLERING/NEDERLANDSE FREELANCERS/ANP

Adapting to climate change

To promote the availability of climate data and encourage its analysis, the Union of Concerned Scientists (UCS) a US-based environmental advocacy group, developed the Climate Hot Map, a web-atlas showing climate 'hot spots'.

Each hot spot describes a location where higher than average regional temperatures have a negative impact on human activities and the environment. (Persistently higher regional temperatures are an indicator of climate change.)

On the Climate Hot Map website, users can select any hot spot to get key facts on how climate change is affecting these places. They can also read about possible mitigation and adaptation measures.

Explore

Visit the Climate Hot Map at www.climatehotmap.org.

The main page opens to show a map of the world with the climate hot spots colour-coded to indicate five categories of environmental features that are affected by a warmer climate: people, freshwater, oceans, ecosystems and temperature.

Under each category, listed below the map, users can check a series of boxes to select which aspects they want the map to display. Checking the 'food' box in the people category, for example, will show places on the map where food supply will be affected by a changing climate.

You can click on the hot spot placemark on the map to get more details, including an image, a brief description of the location, and details about the three most severe impacts affecting that area. For example, the map displays several locations when the 'food' box is checked, including one in the Western Highveld in South Africa. The text tells us that 'Unless we act now to curb heat-trapping emissions, corn production in the Western Highveld is expected to decline, destabilizing the food supply of millions of people'.

The text box provides only a brief summary of the information available, but also includes links with details about how to take action, learn about potential regional solutions to the global warming problem, or access the whole factsheet of the hot spot complete with key facts, details and endnotes.

The hot spot information can also be downloaded and explored in Google Earth. Click on the Google link at bottom left corner of the map to download the KML file. Locate the downloaded file on your computer and double click to o view the information in Google Earth. From the program you can drag the KML file from the 'Temporary Places' folder in the frame on the left, and drop it in the 'Places' folder to store the file permanently on your computer.

Understand

The information on each hot spot is also available from the Climate Hot Map main page, by clicking on the four tabs above the interactive map. The first tab from the left is a list of all the hot spots organised into regional groups. Click on a region listed on the left to show the associated hot spots. Click on one to open its complete factsheet.

The second tab is the map itself where you can choose the hot spots by geographical location or type of impacts.

The third tab 'See Impacts' gives an overview of the five main impact categories: people, freshwater, oceans, ecosystems and temperatures. Clicking any of the impacts refreshes the page to show the associated information and a link to references. The 'food' section, for example, reveals information on how climate change can reduce agricultural productivity, lead to increased irrigation and threats from pests, and warns of severe shifts in seasonal rainfall patterns.

The site provides further information on the causes of climate change, and has a glossary of climate change terms, both of which can be accessed by clicking the relevant links at the top of any page on the site.

Act

The 'Find Solutions' tab gives more details on the mitigation and adaptation measures needed to tackle climate change.

The Solutions page is organised into world regions, and gives information on each region, such as what is being done to reduce the effects of climate change. Each regional page provides links to websites of institutions and programmes dedicated to the issue.

Related resources

The Climate Hot Map is one of several tools related to climate change awareness. The Consultative Group on International Agricultural Research (CGIAR) Climate Change, Agriculture and Food Security research programme has its own map of climate hot spots (http://goo.gl/KAyDw) – along with a tools, a data portal (http://goo.gl/uu6KC)and a 'related reading' page (http://goo.gl/7Qo7E).

For more details on climate compatible development tools, the Climate Planning website provides an interactive user guide on how to develop sound climate strategies (http://goo.gl/65W1q). ◀

Resources

Adapting to climate change

Documents

Agricultural Technologies for Climate Change Mitigation and Adaptation in Developing Countries
Agriculture in many developing countries, where productivity is already low, will be greatly affected by a changing climate. Farmers will have to adapt if they are going to maintain an income and food security for their families and communities. This paper, published by the International Centre for Trade and Sustainable Development, looks at a number of technologies that can be used to provide farmers with the information they will need to overcome the main challenges of climate change. The authors, Travis Lybbert and Daniel Sumner, also look at the key research institutes and organisations and consider their role in supporting agriculture in developing countries.
➜ **http://goo.gl/wOxtQ**

New and Emergent ICTs and Climate Change in Developing Countries
This paper outlines how new technology, such as GIS, wireless broadband and sensor networks, can be used in developing countries to tackle climate change issues. The author, Stan Karanasios, of the AIMTech Research Group, at the University of Leeds, considers how ICTs can be used to monitor climate change and the environment, their application in disaster management, and for climate change adaptation. The paper provides examples of ICT uses in these areas and how they can benefit communities in developing countries.
➜ **http://goo.gl/QdazJ**

Reducing Agricultural Output Losses


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The UNEP project, Multi-Criteria Analysis (MCA4C) for climate change, was set up to provide guidance to governments preparing climate change mitigation and adaptation strategies. In this paper for MCA4C, Günther Fischer of the International Institute for Applied Systems
➜ **http://goo.gl/65Fvp**

Web resources

AfricaAdapt


ISTOCK

The AfricaAdapt network promotes the exchange of information between research institutions, government departments and local and international organisations to help communities to adapt to climate change and climate variability. The website has a collection of news and events relevant to the topic, and a range of video, audio, text and photo stories from a range of communities.
➜ **www.africa-adapt.net**

Nexus for ICTs, Climate Change and Development
This NICCD website has a wide range of resources on how ICTs can be used in climate change mitigation, monitoring, strategy and adaptation in developing countries. The case studies include reports on how crowdsourcing can be used in climate related disaster reporting, the role of ICTs in early warning systems in Sri Lanka, and the use of cell phones to reduce the adversities of climate change in rural Nepal. The site also contains short action guides, including one on enabling innovative strategies for using ICT for adaptation.
➜ **www.niccd.org**

Latin America and the Caribbean Atlas of Our Changing Environment
This UNEP atlas brings together more than 200 images, illustrating the principal environmental issues of the Latin American and Caribbean region. The project attempts to analyse the changes taking place in the environment by combining satellite images with data. The images show the pressure that the region's diverse ecosystems are facing. One section of the atlas outlines environmental issues in each country, analysing 65 specific national cases. The satellite images, maps and graphs show the deforestation in the region and the changes in land use, loss of biodiversity and degradation of coastal areas.
http://goo.gl/yjuZn

Projects

Anticipating climate change impacts in Boe Boe, Solomon Islands
Through P3DM techniques, this project developed an accurately-scaled model of the community customary lands and waters around the village of Boe Boe in the Solomon Islands. The model shows houses, gardens, routes through mangroves, forest paths, conservation areas, and other relevant landmarks. The project team also conducted climate change vulnerability and adaptive capacity surveys of households to provide community perspectives on climate change impacts, and the villagers' collective ability to respond to these and other development pressures.
➜ **http://goo.gl/VHAfM**

Carbon2Markets


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Carbon2Market is a Michigan State University project that focuses on combining value chains from carbon credits in the carbon financial markets and agro-forestry products for smallholders in developing countries. Carbon2Markets provides accurate measurements of carbon sequestration from reforestation and agro-forestry land management activities using high-resolution remote sensing data, web-GIS tools, and modelling.
➜ **www.carbon2markets.org**

Climate Airwaves
Climate change is not just about farmers getting climate information or learning how to cope with variable weather conditions. Enduring extreme weather has always been part of agriculture, and farmers who live in changeable environments have a lot of knowledge to share with researchers, policy makers and agriculturalists farther afield. Climate Airwaves in Ghana provides such an opportunity by allowing farmers to share their ideas via SMS and community radio programming.
➜ **www.climate-airwaves.org**

Geoff Barnard (geoff.barnard@cdkn.org) is head of knowledge management at the Climate and Development Knowledge Network (www.cdkn.org)

Clearing the climate of confusion

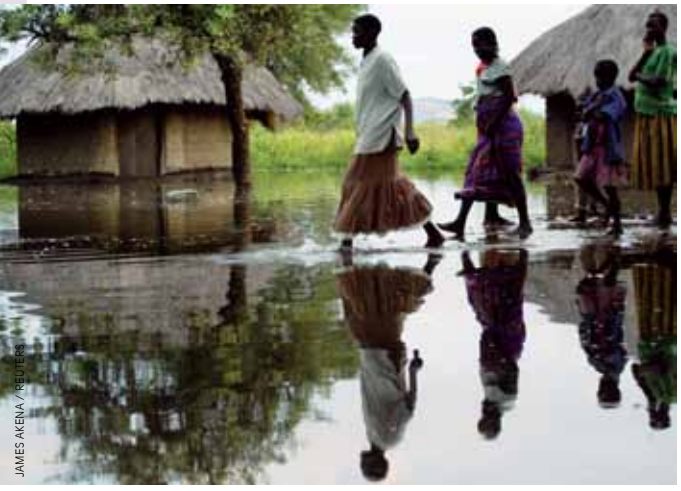
Adapting to climate change

How will climate change affect farmers in developing countries?

➜ The indications are that very few farmers anywhere on the globe will be unaffected by climate change, but there are likely to be winners as well as losers. The latest predictions for Africa from the Intergovernmental Panel on Climate Change, for example, show an average temperature increase of more than 3°C by the end of this century across the continent, while rainfall is predicted to increase by 7% in east Africa but decrease by 4% in southern Africa. On top of this, farmers will have to deal with more extreme weather events, like floods and cyclones. Sea level rise adds to the pressure in coastal zones, a key issue for many small island states.

Coping with these changes will be a tall order for industrialised farmers with access to capital, insurance, modern technology and the latest scientific advice. For subsistence farmers operating on the margins, it will be an even greater challenge.

'There is still a massive communication gap between researchers and the ultimate beneficiaries, farmers.'



JAMES AKENA / REUTERS

How can ICTs help farmers deal with climate change?

➜ Communication is going to be critical in helping farmers win this battle, and it is a real advantage that cell phones are now reaching most rural communities in ACP countries. And access to the internet via smartphones is now on the horizon too. This provides communication options that were unthinkable a few years ago. It is not unrealistic to think that farmers, even in remote areas, will have access to modern online communication channels within the next decade or two.

The technology, however, is only half the problem. Having reliable, relevant and appropriately tailored information to pass through those channels is also essential. Right now, the web is awash with climate data, research reports, contradictory statements, and a fair amount of deliberate misinformation. Even trained researchers can have difficulty getting to grips with it; for a farmer looking for practical information they can trust, it is even tougher.

There are also problems with terminology and translation of key terms into indigenous languages. There is a big job to be done getting the basic concepts across, so farmers have the information they need to respond.

Can ICTs be used to help farmers access accurate weather forecasts?

➜ For short-term weather forecasting, SMS services are already available in some countries, and as cell phone use picks up these are likely to spread. SMS is also being used in creative ways as part of cyclone and flood alert systems, helping farmers to get their families and livestock to safety.

Longer-term weather forecasting is trickier. Having reliable forecasts for three to six months ahead would transform the picture for farmers. It would make a huge difference in helping them decide what crops to plant, whether a lower-yielding drought-resistant variety would be a better bet than a higher-yielding standard variety, for example. Cell phones would be one of the ideal ways of delivering this information. Unfortunately, the ability to provide this kind of seasonal forecast is some way off.

How does the information collected get from the major research institutes to people in rural communities?

➜ Too often, the answer is that it doesn't. Whether it is climate data or information on new cropping patterns, there is still a massive communication gap in many cases between researchers and the ultimate beneficiaries, farmers. The good news is that many research institutions (and, importantly, their funders) are waking up to this and putting more emphasis on communication.

Individual research institutions can only do so much, however, and I am a particular advocate of the role that intermediary organisations can play in bringing together research from different sources, summarising and repackaging it into formats that are more understandable for policy makers, extension workers, farmers and other users, and getting it to them through the appropriate channels.

How can online information services collaborate more effectively?

➜ In the climate sector, there are now many excellent websites out there, but this creates problems of its own – one that has been dubbed 'portal proliferation syndrome'. With so many websites, it is hard to know where to start, and a new one seems to pop up each week. Duplication of effort is undoubtedly happening, and users are left scratching their heads.

To tackle this, a workshop was held recently in Germany for a range of people working on the subject of climate change. Staff from 21 leading global and regional climate websites got together to discuss how they could collaborate more effectively. A host of ideas emerged, including content sharing arrangements, a joint search facility, and a 'portal of portals' to guide users to the most relevant site. ◀

Related links

Climate Change Agriculture and Food Security
➜ http://ccafs.cgiar.org/

More on 'portal proliferation syndrome'
➜ http://cdkn.org/2011/06/portal-proliferation-syndrome

Clean energy search engine
➜ www.reegle.info


BRUNO VAN MOERKERKEN

Cell phone efficiency

Recognising that many of its customers are farmers, the telecommunications company, Vodafone, has prepared a report looking at the role of cell phones in agriculture. Entitled Connected Agriculture, the report outlines twelve ways in which cell phones could be used to improve the efficiency and sustainability of agricultural value chains.

The twelve 'opportunities' include improving mobile financial services, such as payment, micro-insurance and loan systems, and developing platforms to promote the trading, tendering and bartering of agricultural products.

Information for farmers, the report says, is crucial for improving production. 'Using mobiles to increase access to expert agricultural information has the advantage of providing real-time support, and could be a more cost-effective way of distributing updates as well as complementing or reinforcing other sources of information that help farmers.'

Improving and building on existing information services that provide news, advice and weather data is one of the suggestions in the report. Increased access to such services through cell phones could, say the authors, generate an additional US$52 billion in agricultural income in 2020.

Using cell phones for traceability and improving data availability would also lead to savings from more efficient transport, processing and distribution.

➜ Download the full report: http://goo.gl/TkFI6

The world's cheapest tablet computer

In early October 2011, the Indian government launched a low-cost tablet computer, known as Aakash, in an effort to tackle rural poverty in the country. The device costs around US$50, and runs on the Android 2.2 operating system with a relatively slow 256 megabyte RAM. It has a seven-inch touch-sensitive colour screen, WiFi internet access, two USB ports and a slot for a memory card of up to 32 gigabytes. The battery is expected to last for at least three hours after being fully charged, but can currently only be charged from mains electricity. The developers had hoped to include a solar-power recharging function, but that might only be available in subsequent designs. The software allows word processing, web browsing and video conferencing facilities. Aakash (Hindi for sky), took six years to develop and will initially be available to higher education students who can buy it for half price (US$25).


PARIVARTAN SHARMA / REUTERS

Money for value chains

Agriculture in Africa lacks sufficient funding to ensure continued expansion of the sector, according to Making Finance Work for Africa (MFW4A), a partnership of organisations to support Africa's financial sector. Based at the African Development Bank, MFW4A set up a task force to research and develop policy recommendations on agricultural finance for the G20 summit in Cannes, France in November 2011.

A recently commissioned study by MFW4A examined the availability of finance for agriculture in four African countries, Kenya, Ghana, Burkina Faso and Ethiopia. The research analysed the value chains for a variety of commodities, including dairy, fruit, coffee, cocoa and cotton.

One of the main findings is that current land tenure systems in many African countries make it difficult for small-scale farmers to invest in their businesses. 'Land reform is essential,' the research notes, 'to encourage the development of a larger class of "professional" farmers willing to invest heavily in farm improvement and expansion with a view to improving profitability and economies of scale over the longer-term.'

MFW4A remains positive, however, about future investment possibilities in agriculture across the continent since banking services are growing rapidly in many countries. The study's authors recommend further development of rural credit union schemes and the introduction of more capital into the sector, along with concentrated efforts from related development organisations.

➜ Read the research findings at http://goo.gl/tW2IH

Land management mapping

AKINTUNDE AKINLEYE / REUTERS

The Rwanda Natural Resources Authority (RNRA) is using GIS to improve the country's land management systems. 'The promotion of GIS will enable Rwanda to get the optimal information concerning infrastructure and business planning,' said Didier Sagashya, deputy director general in charge of lands and mapping at RNRA.

The Authority has already surveyed more than three million plots of land in the Kigali City and Kirehe districts, with further mapping work continuing throughout the country. As part of the process, RNRA will organise training programmes to develop GIS skills in Rwanda, and raise awareness with the land management project. The RNRA has already held workshops with international partners, including the ITC Faculty of Geo-Information Science and Earth Observation of the University of Twente, in the Netherlands, and Esri, a GIS software developer. Sagashya hopes the project will lead to greater cooperation between the public and private sectors, who will be able to use the data gathered in future developments.

ISTOCK

Web-based nutrition information

The World Health Organization (WHO) has launched a website to provide governments and health-care workers with guidelines for tackling malnutrition. The e-Library of Evidence for Nutrition Actions (eLENA) collates scientific data, resources and information related to nutrition. The tool is part of WHO's global drive to help countries improve nutrition and ensure their response includes the agriculture, health, social protection and food security sectors.

'Several billion people are affected by one or more types of malnutrition,' said Dr Ala Alwan, WHO Assistant Director-General of Noncommunicable Diseases and Mental Health. 'Countries need access to the science and evidence-informed guidance to reduce the needless death and suffering associated with malnutrition. eLENA can greatly improve how countries cope with the terrible health threats posed by malnutrition.' Although currently only available in English, the site will soon be translated into Arabic, Chinese, French, Russian and Spanish. WHO also have plans to distribute the information on CD.

➜ Visit the eLENA website: www.who.int/elena/en

ICTs promote business development

More effective use of ICTs by government programmes to support micro and small enterprises (MSEs) will help accelerate job creation and business growth, according to the United Nations Conference on Trade and Development (UNCTAD) in the Information Economy Report 2011: ICTs as an Enabler for Private Sector Development.

The report notes that the expanding range of mobile applications – text messaging, mobile internet and mobile banking – can deliver a multitude of highly relevant services for MSEs. The authors review a number of cases from ACP countries, such as the Digital Early Warning Network, which is helping to fight pests and diseases in Tanzania, and the DrumNet information service in Kenya, which is helping farmers achieve higher sales volumes and incomes through the use of their mobile phones.

To be successful, ICTs for private sector development need to factor in both user needs (in terms of what information and other inputs are needed) and possible constraints (for example, literacy rates, aversion to using new tools, scarce electricity and unaffordable user charges and prices). Involving the private sector in the design and provision of training and advisory services can help ensure that the services offered are truly demand-driven.

However, the report also stresses that better data, more research and rigorous impact assessments are needed.

UNCTAD also makes several policy recommendations, including adopting regulatory frameworks to build confidence in the use of new technologies or new applications, and developing donor guidelines to ensure that the ICT potential is fully reflected in their private sector development strategies.

➜ Download the full report: http://goo.gl/IDA0H

744 weather stations operational in Africa. The World Meteorological Organization (WMO) says the continent ideally needs 10,000 http://goo.gl/IxIEy

585 million, the number of people in sub-Saharan Africa living in households without access to electricity in 2009 http://goo.gl/74NGL

5719 households in Morphil, Senegal will get solar-powered electricity when a rural electrification project is completed in 2013 http://goo.gl/fkdaq

Store and share for the future

Brent Theophille (brenttheo@gmail.com) is a research assistant at the Caribbean Regional Agricultural Policy Network (CaRAPN)

Web sites

I regularly look at the BBC news, particularly their environment, technology and health pages. And I go to Caribbean360news.com for interesting articles, especially those that deal with socio-economic issues related to agriculture. These are useful in my work as a research assistant where I process and synthesise relevant material to be shared within the organisation and elsewhere. I also 'like' and post links to useful articles on my Facebook page, which I use as a kind of repository for information I might want to refer to later. I find it a helpful way to save web pages, similar to saving them as bookmarks.

I also receive e-mail newsletters from the Global Policy Forum and Trade Negotiations Insights, both of which provide links to the full-length articles on their websites. These are excellent resources for keeping up to date on trade and policy initiatives around the world. Many of their articles are related to agriculture, food and nutrition security and other areas that are interesting for my work.

Our organisation, CaRAPN, also has a Facebook page where I share some of the articles and my work with partners and the public.

➜ **BBC news: www.bbc.co.uk/news/**
➜ **Caribbean360: Caribbean360news.com**
➜ **Global Policy Forum: www.globalpolicy.org**
➜ **Trade Negotiations Insights: http://ictsd.org/news/tni/**
➜ **CaRAPN Facebook page: http://goo.gl/ipTVX**

ANTONIO KAMINJU/AFRICANPICTURES/HH

Web tools

I use Skype often for my work. Earlier this year, we were actively engaged in developing strategic plans with Ministries of Agriculture and partners in four different Caribbean countries. We used Skype and Elluminate to communicate through individual calls and for participating in virtual conferences. Elluminate's conference-calling facilities were especially useful, and its Blackboard Collaborate feature helped in making notes and sharing ideas.

I also use Gmail's video and chat features to talk with colleagues and friends, and use Google Groups to network, send e-mails, have virtual discussions, and plan activities.

I find the ReminderFox add-on for the Mozilla Firefox web browser very easy to use as a calendar, and it is helpful for reminding me of all the things I have to do in a day. The fact that I spend most of my day in front of a computer, and usually with the web browser open, means I don't have to worry about always having to keep the notepad with my to-do list or little reminders scribbled on post-it notes.

➜ **Skype: www.skype.com**
➜ **Elluminate: www.elluminate.com**
➜ **Gmail: http://mail.google.com**
➜ **ReminderFox: http://goo.gl/nBM9v**

Social networking

We have been developing the CaRAPN Facebook page, adding photographs and links to relevant web pages which our colleagues and partners might be interested in. We also use it to promote the documents we have uploaded to Scribd, which serves as an online storage space for articles and publications. We plan to upload newsletters on a more regular basis, along with policy briefs, articles and the Agriculture Agenda, which is a weekly diary of events related to agricultural development in the region.

Also, there is ResearchGate where you can view the research work that colleagues around the world are involved in. They have a virtual 'distinguished lectures' series where you can listen in to talks given by prominent researchers. It's pretty cool.

➜ **Scribd: www.scribd.com**
➜ **LinkedIn: www.linkedin.com**
➜ **ResearchGate: www.researchgate.net**

Devices

I am very interested in photography, and take a lot of photos with my digital camera. We then use these in our publications and other work activities. Work without my laptop would be problematic. I like to keep old work files and resource material close at hand because I can still get ideas from them. I often save good research articles or reference books on subjects as broad as econometrics or statistics, and I usually find new uses for them sooner or later. It is necessary, therefore, for me to keep a back-up of all my files on an external hard-drive, but I like to have it on my laptop too for easier access.

Both the external drive (360 GB) and my laptop are always with me when I travel. I use an automatic backup system to copy the files regularly from my laptop to the external drive. I also use Scribd to save articles on the web, which I can access anywhere from the internet, and sometimes I even e-mail documents to myself as a backup.

Future

I am looking forward to a tablet device that would be more functional for my work: one that can link to and update work files automatically and which would allow me to access saved files either through a local wireless network or via the internet. . Another useful feature would be an improved sorting and file management system that would keep track of all the documents and automatically categorise them for future use. Sifting through all those folders to find the right file that I saved several years ago can be a huge task at times. ◀

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